**MITRE**

# U.S. Coast Guard

# Lessons Learned from Selected Large-Scale Modernization Programs

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# 1.    Introduction

This document provides the U.S. Coast Guard the results of lessons learned from prior large-scale modernization programs that could be applied to the Deepwater Modernization Program.

The Coast Guard's initial request to the MITRE Corporation (MITRE) was to look at the role of the system integrator (SI) in modernization and to identify attributes that contributed to the success or failure of the effort.  However, the research established that the role of the SI was not the sole factor in the success or failure of modernization, so a cross-sectional analysis of programs was performed to identify a broader set of problem areas that the Coast Guard may encounter in the Deepwater modernization.  A set of lessons learned is provided based on the analysis of the programs.

Much of the information in this report, drawn from MITRE's experience in large-scale programs, is organized around summaries of six civilian modernization programs for other government agencies (OGAs).  MITRE has extensive experience with the first three programs, and current MITRE staff acquired experience with the last three programs while they were working directly for the agency indicated.

- Internal Revenue Service (IRS)

- Federal Aviation Administration (FAA)

- U. S. Customs Service (Customs)

- Additional Programs:

    - U.S. Postal Service (USPS)

    - Two national intelligence programs.

In addition, MITRE staff analyzed General Accounting Office (GAO) reports on acquisition programs to identify common themes in GAO's review of federal agency modernization activities.  The final section of this report compiles the findings of these analyses into a checklist that the Coast Guard can use to evaluate its current position in preparing for Deepwater and associated GAO reviews.

The Coast Guard is attempting a very ambitious acquisition with its planned Deepwater modernization program, which is to be implemented over 30 years.  The agency has been and will continue to be scrutinized, as are many other federal entities involved in information technology (IT) modernization.  The lessons learned described in this report will help the Coast Guard avoid some of the pitfalls previously faced by other agencies and programs.

## 2. Acquisition Approaches Used in Other Government Agencies

### 2.1 Internal Revenue Service

The IRS embarked upon its current systems modernization effort in December 1998, when it contracted with Computer Sciences Corporation (CSC) to serve as the lead contractor in a corporate partnership called the PRIME Alliance. In October 1998, the IRS awarded a contract to sponsor a Federally Funded Research and Development Center (FFRDC) through MITRE. The FFRDC provides expert and objective strategic, technical, and program management advice, guidance, and support services, and one of its responsibilities is to assist the IRS in managing the PRIME contractor.

### IRS Background

The IRS systems modernization efforts prior to December 1998 centered on distinct projects to improve capabilities. In the mid-1990s, the modernization program received strong criticism from GAO and funding was curtailed.[1] Although IRS system elements were upgraded, overall plans for integrated business process improvement in conjunction with system upgrades were not realized. The prior Tax System Modernization effort could be characterized as a collection of incremental improvements that were not fully integrated into a full-scale modernization program.

GAO later advised the IRS that the agency must define plans and strengthen capabilities before obtaining additional contractual support. The IRS was exploring the use of a "prime" contractor that would have responsibility for developing, delivering, and deploying modernized information systems, and the agency believed it could award such a contract by1998. The IRS indicated it planned to make greater use of private sector by engaging in the following activities.

- Preparing an acquisition plan and statement of work (SOW) for competitive selection of a prime development and integration contractor

- Transferring responsibility for systems engineering, design, prototyping, and integration to the prime contractor

- Making greater use of software development contractors to build major elements of production systems.

However, GAO noted that the IRS had not yet developed any real plans to implement the move toward using private sector resources, observing that "…plans to use additional contractors will succeed if, and only if, IRS has in-house capabilities to manage these contractors effectively. In this regard, there is clear evidence that IRS' capability to manage contractors has weaknesses."[2]

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[1] GAO's concerns included that "…the government's investment of what could be more than $8 billion (the cost of IRS modernization from 1986 projected through 2001) and IRS' efforts to modernize tax processing are at serious risk due to remaining pervasive management and technical weaknesses that impede modernization efforts." GAO noted that the IRS lacked the full range of management and technical foundations to realize tax systems modernization (TSM) objectives. *Tax Systems Modernization: Management and Technical Weaknesses Must be Corrected if Modernization is to Succeed* (GAO/AIMD-95-156, July 1995).

[2] *Tax Systems Modernization: Actions Underway but Management and Technical Weaknesses Not Yet Corrected* (GAO/T0AIMD-96-165, September 10, 1996).

The Computer Science and Telecommunications Board of the National Research Council (NRC) evaluated the IRS TSM program and issued a report in 1996.[3]  Major recommendations contained in the report were that the IRS should:

- Acquire more technical management expertise, including a highly-qualified chief information officer (CIO)

- Effectively integrate operational and technical goals by developing a proper set of metrics to measure performance

- Develop an adequate architectural definition and design and a process for maintaining them properly (the project to be led by the Systems Architects Office and enforced by a strong set of interface specifications for key applications or systems)

- Significantly increase the scope, level of effort (LOE), management attention, and tools devoted to security development

- Implement an overall process improvement plan, including Software Engineering Institute Capability Maturity Model (SEI-CMM) Level 2 for software development.

Other factors MITRE observed were that barriers existed between IRS business elements and its information system support staff; competing priorities existed among legacy operational needs, near-term initiatives, and longer-term modernization needs; and the focus of TSM was on technology and not on new business processes.  These issues are being addressed in the current modernization program.

## Current IRS Approach

The current IRS modernization approach, drawing heavily from the observations and recommendations contained in the analyses of the TSM program, is composed of two major but separate elements: organizational modernization and business systems modernization.

The Organizational Modernization Program undertaken in response to the Restructuring and Reform Act of 1998, is designed to realign tax-related activities into four business operating divisions that concentrate on functional tax areas.  The areas are Wage and Income, Small Business and Self-Employed, Large and Mid-Sized Businesses, and Tax-Exempt and Government Entities.  The realignment, implemented on 1 October 2000, constitutes a change from the previous, geographically based organization and provides the new business model that systems modernization will support.

The business systems modernization effort, managed by the Business Systems Modernization Office (BSMO) under the direction of the CIO, has been funded separately by Congress via the Information Technology Investment Account.  Congress releases funds incrementally in response to spending plans that address progress made to date and plans for future expenditures.  The effort will concentrate on upgrading systems capabilities to support the new business model

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[3] *Continued Review of the Tax Systems Modernization of the Internal Revenue Service* (Committee on Continued Review of the Tax Systems Modernization of the Internal Revenue Service, Computer Science and Telecommunications Board, Commission on Physical Sciences, Mathematics, and Applications, National Research Council, Washington, DC, National Academy Press, 1996).

and the need to replace software and processes that have been identified as antiquated.  This will result in enhanced systems business processes and related systems support.

The IRS has sought to incorporate recommendations from the GAO, NRC, and MITRE in its modernization effort.  Table 1 summarizes the recommendations and the remedies instituted by the IRS.

**Table 1.  Recommendations and Remedies**

| Recommendation | Remedy |
|---|---|
| Prepare an acquisition plan and SOW for competitive selection of a prime development and integration contractor, transferring responsibility for systems engineering, design, prototyping, and integration to that contractor. | In December 1998, the IRS selected Computer Sciences Corporation as the PRIME contractor responsible for systems development and integration. |
| Develop an adequate architectural definition and design to guide systems modernization because the IRS strategic information management practices are not fully in place. | Systems Architecture (Version 1.0) was approved by the IRS Commissioner in January 2001.  Prior to that the Modernization Blueprint served that function. |
| Acquire more technical management expertise, including a highly-qualified CIO. | The IRS hired a strong CIO who is working to integrate modernization more closely with the current production environment required for current operations.  BSMO staff is actively developing their technical and management expertise. |
| Integrate operational and technical goals by developing a proper set of metrics to measure performance | BSMO personnel have initiated the use of a Management Information Center that currently integrates earned value and schedule data.  Efforts are underway to include new technical performance measures to develop an appropriate set of metrics as suggested by GAO. |
| Increase the scope, LOE, management attention, and tools devoted to security development. | The IRS Office of Security is addressing IT security concerns.  The IRS has initiated the Security and Technology Infrastructure Release project to provide a robust, secure system infrastructure to support required business functionality. |
| Implement an overall process improvement plan, including SEI-CMM Level 2 for software development. | BSMO has adopted the SEI Software Acquisition Capability Maturity Model (SA-CMM®), and is working to achieve Level 2 standards for the modernization program. The IRS has established a minimum CMM Level 2 certification requirement of the contractors performing software development. |

| Recommendation | Remedy |
|---|---|
| Establish an effective organizational structure to manage and control systems modernization consistently across the organization. | The IRS has made progress in implementing management controls and capabilities. It has largely defined and has begun implementing a system life cycle methodology that incorporates software acquisition and investment management processes. It has also made progress toward completing its enterprise architecture (EA).[4] |

The IRS uses the Core Business Systems Executive Steering Committee (CBS-ESC), chaired by the Commissioner, to make strategic business decisions. CBS-ESC members, who review each project as it approaches a decision milestone, include individuals representing the major IRS business units. By bringing these players into a decision forum, the IRS has taken a major step toward eliminating previously existing barriers.

The IRS and the PRIME use enterprise life cycle methodology (ELCM) to define the milestones, processes, products, techniques, and procedures associated with planning, executing, and managing business change and system development. Business cases, providing the rationale for continuing with modernization projects, are reviewed at the milestone review decision points.

One of the major challenges facing the IRS is integrating the modernization effort with the agency's ongoing operations, which limits the number of IRS staffers who can be diverted from current operations to modernization support. This is complicated by the fact that Congress provides modernization funding separately from the funding used to keep current production systems operating. The IRS is moving towards an integrated portfolio management and investment process that will combine resource allocations and project prioritization.

BSMO has established a communications office whose staff members schedule regular meetings with representatives from oversight organizations. These meetings provide the opportunity for the exchange of information that facilitates spending plan reviews. Oversight representatives also attend CBS-ESC meetings.

GAO noted that the IRS made substantial progress in implementing modernization management capabilities and addressing GAO recommendations. Notable areas of improvement include implementing the ELCM that incorporates software acquisition and investment management processes, and progress toward completing the agency's EA.[5]

## IRS Lessons Learned

The following summary of the lessons learned from the IRS modernization effort have been developed through review of published reports and the experience of the MITRE staff.

- Governance procedures must be in place to manage modernization (including an EA) to:

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[4] _IRS Modernization: Continued Improvement in Management Capability Needed to Support Long-Term Transformation_ (GAO-01-700T, May 8, 2001).

[5] Ibid.

- Provide the modernization framework

- Define roles, responsibilities, and processes for life cycle management

- Delineate a decision-making process that includes top management and major stakeholders.

- The plans for modernization must be inclusive and achievable. They should include a portfolio management approach to resource allocation decisions that encompasses current operations and modernization, and should gauge the capability of delivering and implementing change so that schedules and commitments are met.

- External help should be sought if all the requisite skills do not exist in-house, or may be available only on a limited basis because of the requirement to sustain current operations. A long-term strategy should be devised to determine what to accomplish with in-house resources and what should be achieved using contractor resources.

- The agency must be able to sustain current operations during modernization. Although upgrades of current systems are essential, they must be integrated with modernization.

- Business cases, approved by top management and reviewed by oversight, should be used to justify continuing projects at milestone reviews, along with an integrated investment decision process that prioritizes modernization projects and delineates the efforts required to sustain current capability.

- Engagement with oversight organizations should be pursued actively. Frequent and open communications will decrease the level of surprise and assist oversight groups in their review of modernization spending plans.

- Systems engineering must be part of all life cycle activities to assure that the products will be coherent, predictable, and manageable, and will deliver business value.

- A release management perspective should be adopted to identify when interdependent system upgrades are ready to be integrated so that their delivery at a given point in time will produce useable business results.

## IRS Summary

Prior modernization efforts during which the IRS served as the SI were less than successful. Since December 1998, the IRS has initiated strong modernization management with increased support for the business units. As a result, GAO noted that the IRS made important progress in addressing program management and other items on GAO's list of concerns.

## 2.2    Federal Aviation Administration

The FAA modernization program is a complex system-of-systems effort. Begun in 1981 to replace and upgrade National Airspace System (NAS) equipment and facilities, its scope has grown during the past 20 years.

The FAA's modernization program was expected to continue through at least FY2005, with an estimated cost of $45 billion. With $32 billion already appropriated through FY2000, the FAA estimates that it will need $13 billion more to complete the program.[6] However, with the recent implementation of the Operational Evolution Plan [(OEP) see Current FAA Approach, below], the NAS upgrade will continue beyond FY2010. Current FAA plans are to modernize continually in an evolutionary process.

In 1990, the FAA executed an agreement with MITRE to establish an FFRDC that would provide an essential research and engineering capability to support FAA's missions. The goal of MITRE's support to the FAA is to perform the studies and analyses, and formulate the concepts, for continued advanced aviation research to modernize and develop NAS. MITRE assists the FAA in addressing the long- and short-term evolutionary changes necessary to accomplish this mission.

## FAA Background

The FAA modernization effort can be described in terms of three phases, 1988 to 1994, 1994 to 1998, and the current approach. The following sections describe each of these phases.

Over the years, GAO has continually reviewed progress and has pinpointed the following root causes of the FAA's modernization problems.

- Immature software acquisition capabilities

- The lack of a complete and enforced systems architecture

- Inadequate cost estimating and cost accounting procedures

- The lack of an effective CIO management structure

- An ineffective investment management process

- An organizational structure that impaired the acquisition process.[7]

### *The Advanced Automation System Program (1988 to 1994)*

The Advanced Automation System (AAS) program was the centerpiece of NAS, an ambitious effort begun in the 1980s to replace computer hardware and software—including controller stations, and en route, tower, and terminal air traffic control facilities. The contract for AAS, awarded to IBM in 1988, was structured in five individual segments using a "building block" approach.[8] After sustaining serious cost and schedule problems, FAA dramatically restructured the program into more manageable pieces in 1994.

AAS failed because of overambitious plans by the FAA and the contractor, poor FAA oversight of contractor performance in developing software, and FAA's indecisiveness about requirements. Both FAA and IBM drastically underestimated the complexity of developing AAS software.

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[6] *High-Risk Series: An Update* (GAO-01-263, January 2001).

[7] Ibid.

[8] *Air Traffic Control: Uncertainties and Challenges Face FAA's Advanced Automation System* (GAO/T-RCED-93-30, April 19, 1993).

Many problems were directly related to FAA's attempt to accomplish research, development, and production tasks simultaneously.

Software development proved to be the Achilles' heel of the AAS program. The FAA changed requirements with little regard for how changes would affect the schedule and cost of the program. The number and type of modifications reflected the agency's lack of experience in managing large-scale projects that relied so heavily on software.[9]

### Restructured FAA Modernization Program (1994 to 1998)

In 1996, the GAO reported that FAA's organizational culture had been an underlying cause of the agency's acquisition problems. FAA employees acted in ways that did not reflect a strong commitment to mission focus, accountability, coordination, and adaptability.[10] FAA's organizational incentives discouraged disclosing news of cost increases, schedule delays, and performance problems.

According to a 1994 Center for Naval Analyses (CNA) study, the suppression of bad news prevented top management from taking early action. Accountability was not well defined or enforced for decisions about requirements and contract oversight—two essential responsibilities in managing acquisitions. CNA also reported that FAA did not enforce such normal contract management procedures as continuously monitoring expenditures, milestones, and deliverables. Weak oversight of the contractor was a contributing factor in the cost overruns and schedule delays experienced in implementing the AAS.[11] Because of the number and severity of the weaknesses in the FAA air traffic control (ATC) modernization software acquisition process, FAA did not fully satisfy any of the seven SEI key process areas to achieve the "repeatable" level of process maturity.[12]

In late 1997, the FAA developed the Integrated Capability Maturity Model (FAA-iCMM®) in response to GAO comments about its ability to manage software-intensive modernization efforts. The FAA-iCMM integrates Systems Engineering CMM (SE-CMM), Software Acquisition CMM (SA-CMM®), and Software CMM (SW-CMM), and contains acquisition, engineering, and management processes. FAA believes that the FAA-iCMM integrates best practice guidance in engineering, acquisition, and management, providing direction in four crucial areas.

- What the FAA does (process areas)

- How well the FAA does it (capability levels)

- What the FAA should focus on next (maturity levels)

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[9] *Advance Automation System Audit Report* (Office of the Inspector General, Department of Transportation, AV-1998-113, April 15, 1998).

[10] *Aviation Acquisition: A Comprehensive Strategy is Needed for Cultural Change at FAA* (GAO/RCED-96-159, August 1996).

[11] Ibid.

[12] *Air Traffic Control: Immature Software Acquisition Processes Increase FAA System Acquisition Risks* (GAO/AIMD-97-47, March 1997).

- How the FAA should measure capability levels (appraisal).[13]

The FAA is achieving more effective, efficient, and improved processes by using the integrated model rather than using the three source CMMs separately.[14]

In its February 1998 report entitled, "Observations of FAA's Modernization Program," GAO made the following findings.

- A complete systems architecture is crucial to guiding and constraining ATC modernization investments. FAA proceeded to modernize its many ATC systems without the benefit of a complete systems architecture or blueprint to guide their development and evolution. Although FAA has done a good job of defining the logical architecture, it needs to develop its technical architecture. FAA's system modernization also lacks an effective enforcement mechanism.

- Reliable cost information is needed to manage modernization projects effectively. FAA lacks reliable cost estimating processes and accounting practices needed to manage IT investments, increasing the likelihood of poor investment decisions.

- Mature software acquisition capability is important to success. Because FAA's processes for acquiring software (the most costly and complex component of ATC systems) are ad hoc, sometimes chaotic, and not repeatable across projects, FAA is at great risk of acquiring software that does not perform as intended and is not delivered on time and within budget.

- Continued management attention is crucial to comprehensive cultural change. GAO found that FAA's acquisitions were impaired when employees acted in ways that did not reflect a strong commitment to mission focus, accountability, coordination, and adaptability.

- FAA will need to continue improving its acquisition management process. FAA does not have an effort underway for effectively measuring progress toward achieving acquisition goals. The agency should have a comprehensive system of performance measurements that can provide systematic feedback about accomplishments and progress in meeting mission objectives.[15]

## Current FAA Approach

Following a series of mishaps and less-than-expected returns from projects, and in response to GAO criticisms, FAA took another look at its program in 1998. As a result, FAA is revamping its approach to modernization, with changes in three areas.

- An evolutionary strategy focusing on near-term effects.

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[13] <www.faa.gov/cm/RegionalMinutes/>.

[14] Process Improvement (FAA-iCMM), <www.faa.gov/AIO/ProcessEngr/iCMM/index.htm>,

[15] *Air Traffic Control: Observations on FAA's Modernization Program* (Testimony, GAO/T-RCED/AIMD-98-93, February 1998).

- A reorganization of the agency into business units to implement a performance-based organization, rather than the previous method of having various pieces of a modernization project located in several offices.

- Implementation of the OEP, an outcome-based approach that institutes a system of accountability in the FAA for operational results. The purpose of the OEP is to get varied stakeholders to work together from the beginning, to change business processes, and to effect system change that needs regulatory approval and operator (controller) buy-in. OEP implementation has resulted in management adjustments and assignment of accountability for successful results to a number of senior FAA managers.[16]

While the FAA has worked to achieve a more cost-effective approach by limiting the scope of projects to more manageable segments, success will not be achieved for several years. The approach in the past had been to develop highly complex, software-intensive systems all at once—an unrealistic goal. The FAA's restructured modernization program—limiting projects to more manageable segments and accelerating the development and deployment of technology projects with potential for near-term user benefits—demonstrates the FAA's response to GAO comments. The agency plans to implement this incremental way of managing to provide immediate improvements that will result in short-term successes. A central tenet, to build a little and test a little for technology development and deployment, will limit development efforts to a manageable scope, identify and mitigate risks, and deploy technologies prior to their full maturity.[17]

FAA's Joint Resources Council makes strategic decisions about which investments best meet the agency's needs and which are to be funded. The FAA developed a set of policies, procedures, and reporting requirements to analyze mission needs, assess the affordability of proposed projects, and establish cost, schedule, and performance parameters to control projects. Upon making an investment decision, the new project is passed to Integrated Project Teams (IPTs) whose membership includes representatives of Air Traffic Services (ATS). The IPTs tend to focus on buying and fielding systems, which is an approach more oriented to engineering than to customers.

The FAA recognized that its organizational structure contributed to problems in developing and fielding new and/or modernized capabilities, and is in the process of a fundamental restructuring of its ATS and Administrator for Research and Acquisition (ARA) organizations.

Organizational responsibility for defining requirements lies with the Air Traffic System Requirements Service, a separate organization within the current operational arm, ATS. Most of the expertise for potential solutions to meet operational requirements currently resides within ARA, of which the IPTs are a part with limited participation by ATS. Significant changes are expected as the FAA makes the transition to the new performance-based organization structure, which will be under a to-be-hired chief operating officer (COO). In addition to hiring a COO, the FAA will establish integrated "business units" combining operations and acquisition responsibilities (e.g., Terminal, En Route) and following the OEP.

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[16] <www.caasd.org>.

[17] Ibid.

## FAA Lessons Learned

The lessons learned from the FAA modernization projects described in this report can be summarized as follows.

- Develop a systems-of-systems incrementally (i.e., don't take on more than can be managed effectively)

- Do not undertake research, development, and production tasks simultaneously

- Generate strong software acquisition processes and SEI CMM capabilities within the agency and the contractor

- Create and enforce a complete systems architecture, including logical and technical architectures

- Produce a systems requirements collection-and-analysis process, and control post-award requirements changes

- Exercise strong program and contract management (e.g., good agency oversight of contractor performance in developing software)

- Develop and use reliable cost estimating and cost accounting procedures to provide valid information to decision makers about investment tradeoff decisions

- Formulate, use, and maintain an effective investment management process

- Build an environment for a healthy esprit de corps by fostering and nurturing an organizational structure that focuses on the mission and requires accountability, coordination, and staff adaptability

- Develop a comprehensive system of performance measures to provide feedback on progress in meeting mission objectives, and measure these against a predeveloped baseline.

## FAA Summary

During the 20 years of its AAS/ATC/NAS modernization, FAA has been the subject of numerous GAO reports and testimonies. The agency has structured its current modernization effort by emphasizing evolutionary modernization and establishing business units reporting to a COO, finding that smaller, more cohesive projects are more manageable. This approach will provide incrementally improved facilities and services to air traffic controllers, airlines, pilots, and the public. The FAA has learned from its modernization attempt and will continue to change to meet its modernization goals.

## 2.3   U.S. Customs Service

Customs is conducting an enterprise-wide modernization effort—the Customs Modernization Program—to improve its commercial, enforcement, and administrative operations. The Customs Modernization Program takes an enterprise approach to defining, planning, developing, and implementing new business processes and the IT infrastructure that supports these processes.

## Customs Background

Customs annually collects more than $20 billion in revenues, and processes more than 12 million formal entries a year, 55 percent of which involve merchandise subject to quota or other trade programs. Customs also monitors an average of 10 million annual export shipments, and processes nearly 450 million passengers entering the United States. Global trading continues to expand and change rapidly as trade barriers are lowered, bilateral and trilateral agreements are reached, free trade zones are created, and developing nations continue to industrialize.

In this environment, Customs plays an increasing role in countering the dual threats of narcotics smuggling and terrorist infiltration at U.S. borders. In addition, Customs mission and responsibilities now extend into other areas of national interest, such as protecting against child pornography and cybersmuggling, and ensuring protection of intellectual property rights.

In recent years, trade growth and expanding law enforcement efforts have placed an ever-growing burden on Customs staff and resources. Customs mission responsibilities have changed dramatically in the years since many of its mainframe-based information systems were developed. Legislative mandates, important federal executive initiatives, and new international trade programs also require that Customs reengineer its operations and develop a flexible, upgradeable infrastructure that can support future requirements. Customs is modernizing its operations and IT infrastructure in response to these needs.

Customs initiated modernization efforts in 1994 by forming a team to develop the Automated Commercial Environment (ACE), a new imports processing system to replace the current Automated Commercial System (ACS). A plan was developed to build and deploy ACE in 21 increments from 1998 through 2005. The first four increments involved deploying a prototype known as the National Customs Automation Program (NCAP), of which the first two increments, NCAP .1 and .2, were deployed in May and October 1998, respectively. Deployment of these first two increments was two years behind the original schedule.

These early modernization efforts lacked credibility with oversight agencies. In 1998 and 1999, the GAO conducted reviews of the ACE project, as well as Customs EA, its systems and software acquisition and development processes. The reviews cited several concerns about Customs modernization efforts generally and the ACE project in particular.

- Lack of an effective management and oversight structure to execute the Modernization Program

- An incomplete information systems EA

- Unstructured processes for IT investment management and system acquisition

- Ineffective software acquisition and development processes.

## Current Customs Approach

Customs undertook several activities to respond to GAO's concerns. First, the agency established a management and executive oversight structure to execute the Modernization Program. Because the program would affect enterprise-wide operations, a Governance Framework was established to assign authority to the different participating entities. An Executive Steering Committee, chaired by the Commissioner, provides strategic direction and

oversight for Modernization projects. The Commissioner appointed the Assistant Commissioner of the Office of Information and Technology (OIT) to serve as Modernization Executive—the single point of responsibility for the program. In addition, Customs established the Customs Modernization Office (CMO) for the sole purpose of managing and providing oversight of the Prime Contractor and modernization projects.

Second, while developing its program management structure, Customs continued its efforts to develop disciplined processes for planning, investment management, and engineering. As a result of these efforts, Customs:

- Developed the Customs EA and ELCM

  - The EA provides the foundation and framework for integrating new information systems. The Customs EA is a repository that captures and amalgamates information describing important business and technical aspects of the Customs enterprise. All Customs IT projects must comply with the EA. The GAO considers Customs the leader in architecture development and implementation in the federal architecture community, and the federal CIO Council has cited Customs EA work as an example of a "Smart Practice."[18]

  - The ELCM is a set of advanced processes, standards, and approaches for strategic planning, program management, enterprise engineering, and acquisition management. Customs is using the ELCM to guide Modernization planning, development, and deployment.

- Implemented an Investment Management Process (IMP) to align its IT projects with its strategic goals and objectives. The Federal CIO Council recognized the Customs IMP as a "Smart Practice."[19]

- Performed an ACE cost benefit analysis (CBA) to determine whether upgrading the existing system or building ACE was the most cost-effective approach. The process consisted of estimating internal and external benefits, and included a risk analysis to account for uncertainties. The CBA confirmed that ACE was a sound investment.

- Generated an Acquisition Plan, Request for Proposal, and Source Selection Plan and processes for acquiring a Prime Contractor to design, build, and integrate new systems.

- Created plans to achieve SA-CMM Level 2 process maturity in acquiring and developing systems and software. Customs established three process groups to develop repeatable procedures.

- Produced a communications strategy to inform stakeholders of progress and program developments. One of the primary objectives of this strategy was keeping oversight agencies informed and engaged in Modernization. Customs staff briefs oversight agency personnel on a regular basis, and these agencies participate in the ESC.

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[18] *Smart Practices,* October 2000.

[19] Ibid.

- Acquired an FFRDC to assist with modernization planning, and provide technical expertise and objective advice based on the FFRDCs experience with large-scale acquisitions and development.

Third, and a key step in the Customs modernization strategy, was the selection of a world-class systems integration and development Prime Contractor to partner with Customs in designing, building, and integrating the modernized systems. Customs envisions this "partnership" with the Prime Contractor as an open, collaborative relationship. The Contractor will be accountable and responsible for all aspects of project-level efforts and will provide technological expertise and innovative ideas to help Customs achieve outstanding processes and service at the program and enterprise levels. The Contractor will be issued individual delivery/task orders and will work with Customs management and staff at multiple levels throughout the effort.

In April 2001, Customs competitively selected IBM Global Services to design, acquire, and implement hardware and software for the Modernization Program. Customs intends to use this contract for the full scope of Modernization activities, but reserves the right to use other contract vehicles when they are in the best interests of the government.

## Customs Lessons Learned

The Customs Modernization Program has produced a body of lessons learned that can be applied to other government modernization efforts, including those listed below.

- Comply with federal rules, policies, requirements, and guidelines with regard to IT investment, acquisition, and development

- Generate a capital planning and investment control process for IT investment

- Develop an EA as a foundation and framework for systems integration

- Establish an ELCM as a framework for IT planning, development, integration, and evaluation

- Create and implement repeatable processes for systems and software acquisition and development

- Keep oversight agencies informed of progress and issues, and engage them early in the planning process.

## Customs Summary

The preparation activities conducted by Customs successfully addressed all of GAO's concerns and resulted in a positive GAO review of program readiness and acquisition processes. GAO recently reviewed the Customs Expenditure Plan for ACE and released the first funding increment, which allowed award of Modernization Prime Contract. GAO concluded that Customs had strengthened software acquisition management and satisfied all of the legislative requirements, and that the agency's plan was consistent with GAO's recommendations that Customs justify and make investment decisions incrementally.

## 2.4    Additional Programs

This section summarizes the experience of MITRE personnel with other large modernization programs.  The lessons learned from these programs are included in the checklist in the final section of this paper.

### 2.4.1  U.S. Postal Service

USPS needed to upgrade its systems to support a change in business needs that required it to make the transition into self-supporting retail sales.  The USPS Point-of-Sale Retail Sales (POS ONE) Program was designed to replace a legacy point-of-sale system at 10,000 sites with a state-of-the-art, wide-area system.

The end-to-end cost for the POS ONE modernization program is estimated at $1.5 billion (including operations and maintenance costs for the deployed systems) for a ten-year program.  The program has spent $650 million from August 1986 until the present.  USPS will fund the program at $150 to $200 million for the next 18 to 24 months, which should take the program through its final upgraded hardware deployment.  After that, activity will shift to software upgrades and operations and maintenance.  The intent of the program is to ride the crest of useable hardware and software technology.

In 1995, three contracts were awarded for the design and production of prototype POS ONE systems.  In 1996, awards were made to two prime contractors for production systems.  The contracts provided for a five-stage program, and each of the two contractors received a Stage I award.

USPS considers POS ONE a major success.  As of May 2001, USPS and prime contractors had deployed in excess of 30,000 POS ONE terminals at nearly 10,000 sites.  The Program is in the final stages of deploying a retail data mart.

A number of attributes contributed to the success of this program.

- A strong program office, led by an empowered program manager using some internal contractor support, provided direction for the two prime contractors and their many subcontractors

- The program office initiated and used a robust communications and requirements tracking system that supported management review and program tracking

- The program situated functional experts at the contractors' facilities, thereby reducing communications and timeliness issues

- A Vice-President's Oversight Committee, as well as strong USPS senior management support, helped to keep the program moving in the correct direction.

As with any large program, areas of POS ONE required adjustments.  For example, program management guidelines (e.g., processes and procedures) had to be developed.  Moreover, when the program began, too little effort had been invested in requirements definition, so that user input, requirements collection, and requirements definition had to be revisited.  The latter contributed to the mistaken belief that commercial-off-the-shelf solutions would meet USPS needs, resulting in schedule delays and cost overruns upon discovering that customized software

was required.  Still another problem area was change management, which was rectified by the introduction of the requirements and communications tracking system.

## 2.4.2  Two National Intelligence Programs

Two national intelligence programs have been combined for analysis because the mission, environment, and complexity of each were similar.

The programs were managed by two separate and unrelated program offices, but shared many similar processes and procedures.  Although operational interfaces existed between the two systems being developed, these were only some of the many interfaces required among the operational systems and other elements in the intelligence community (IC) and the Department of Defense (DoD).  Both programs received continued strong support from Congress and senior management, even when costs and schedules were exceeded.

The first program was a multiyear effort to upgrade national imagery exploitation systems supporting the IC and DoD.  This system-of-systems program, costing $865 million over the course of 5 to 6 years, dealt with complex internal and external interfacing issues between users and disparate internal systems, as well as other systems and databases across the IC.  The program was managed by a centralized program office that supervised three prime contractors (segments), each with numerous subcontractors.

The second program was a continuing effort to upgrade national systems supporting the IC and DoD, and cost approximately $4 billion over the course of 5 years.  This was also a system-of-systems program with complex internal and external interfacing issues among numerous internal systems and a disparate user community.  A centralized program office supervising numerous segment contractors, each employing many subcontractors, managed this program.

The program offices shared many attributes.

- Strong program and project (segment) management

- A dedicated SI support contractor (same company, different divisions) that served as an extension of the government was empowered to act for the program office as necessary, and ensured:
  - Program continuity
  - Continuing attention to requirements, internal and external interfaces, and contractor productivity

- Dedicated contracting personnel, serving partly to secure the focus needed for the program, and partly because each program office was located at a facility removed from the central contracting office

- A strong partnership between the contracting element and program management, contributing to timely and integrated support for the programs' objectives

- A strong integration program, including extensive testing of operational capability, interfacing, and certification of end-to-end systems functionality.

Reflecting program management attitudes of the time, both program offices made similar mistakes.

- An engineering arrogance often resulted in inadequate attention to user requirements, sometimes sacrificing operational capability for cost and schedule, and occurring without user consultation

- Expectations often were managed inadequately

- Promises about schedules, costs, and capabilities could not or were not kept

- System operators sometimes were not fully apprised of system characteristics and resource requirements, necessitating continued use of contractors after operational delivery.

## 2.5   Summary of Findings from OGA Programs

### Strengths and Successes

All of the successful programs reviewed in this document enjoyed a sense of mission and a tendency to focus on the desirable end-state, resulting in a strong "can-do" attitude among staff members. In each case, the organizational culture, management, and leadership created an atmosphere conducive to the changes being brought about by the new systems. The best programs emphasized a continuing effort to produce well-defined requirements.

Another important element of success was congressional support, which remained strong (indirectly with respect to USPS) throughout the life of the program. Successful programs that used SI services were able to maintain a balance between the government and the prime contractor. Additional attributes or approaches that promoted success are listed below.

- Strong, stable management structure and leadership, with continued high-level organizational support for the program

- Willingness to reevaluate, replan, and redirect troubled programs

- Strong program offices with qualified, experienced personnel

- Strong performance accountability

- Enforced program management practices (e.g., requirements management, financial management, operational integration, interface specifications)

- The services of a competent SI contractor whose sole function was systems integration in support of the government program office

- Partnership with organizational support elements (e.g., contracting, finance)

- Integration of contracting staff and management of contractors

- Assignment of dedicated contracting staff to support the program

- A positive relationship with contractors (e.g., a partnership with firm government management)

- Management of expectations.

## Weaknesses and Failures

Common characteristics of less-than-successful programs often centered on lack of management in the agency as well as in the program.

- Lack of attention to user interests: failure to involve users in the end-to-end process, especially those staff members who would be responsible for the system upon delivery (in one case adequate attention was paid to user requirements, but "requirements creep" and poor implementation resulted in deliveries that did not meet user expectations)

- Weakness in collecting, defining, and incorporating business requirements into systems requirements

- Inadequate leadership, accountability, and strategic direction

- Frequent "reorganizations" which created organizational and psychological turbulence.

# 3.    MITRE's Assessments and Recommendations

This section contains MITRE's analysis of the Coast Guard's Deepwater program approach and offers a set of specific recommendations tailored for the Deepwater Acquisition.  The analysis is based on the Deepwater Expert Panel testimony, on lessons learned from OGA program approaches, and on Coast Guard documentation (primarily the Deepwater Phase 2 Program Management Plan and the draft Deepwater Capability Replacement Project Acquisition Plan). MITRE.  The recommendations have been divided into nine main topic areas.  The Conclusion (Section 4) provides a list of lessons learned.

## 3.1    Program Office Structure

One characteristic MITRE found common to all successful programs was a strong program office staffed by people with management and technical expertise.  In all cases, the program offices consolidated and unified the capabilities needed to manage a program and subordinate projects.  Successful programs delineated a structure for the program office, identified key individuals to fulfill vital functions, and, before moving forward, at least started to develop key plans, policies, and procedures for program management.

Less successful programs usually were marked by weak program offices due to inadequate levels of the technical and managerial expertise required to exert control over the program, or failure to establish the program office prior to award of a systems integration contract.  This often was compounded by an inadequately defined requirements baseline from which the program and the contractor could depart.

The Coast Guard has done two things that MITRE believes has set it on the right path.  First, it has recognized the need for, and proposed a strategy for contracting with a SI to gain needed expertise.  Second, the Coast Guard has begun to identify program office needs and personnel, and has started to develop key documentation to support that office.

However, in the time remaining before award, the Coast Guard's Deepwater Program may not be able to implement a unified program office that can provide the leadership and direction required for such a large, complex effort.  A major portion of program office resources are thought to lie in Matrix Project Team (MPT) personnel, who may not be able to provide adequate levels of management and technical expertise dedicated to the program office.

> **Recommendation:**    *Fully establish the PMO structure with associated roles, responsibilities, and processes.  Determine and obtain adequate staff to operate the PMO.*

## 3.2    Strong Contract Management:

Another element found in successful programs was strong contract management.  In cases where taking a firm position with the contractor was necessary, the contract support office had the knowledge and drive to enforce the government's position.  A necessary aspect of strong contract management was a partnership among all PMO elements—the PMO's support for a strong position taken by contracting staff, complemented by the contracting staff's support for the PMO's direction and activities.  This partnership among all elements of the PMO fostered a successful program.

> *Recommendation:*        *Provide program office support for strong contract*
>                          *management to foster a successful program.*

## 3.3    Use of MPTs

MITRE has some concerns with the Coast Guard's plan to use MPTs to manage project tasks and conduct research in principal customer areas of interest.  This appears to be a fragmentation of project management.  The MPT provides an excellent avenue for user input into requirements and for continuing visibility into the project's progress.  However, a coherent, unified, and dedicated program office should manage the project.

> *Recommendation:*        *The efficacy of using MPTs to solve management problems*
>                          *should not be overestimated.  Rather, a coherent, unified,*
>                          *and dedicated PMO should be established to manage the*
>                          *project.*

## 3.4    User Involvement

MITRE's analysis of the OGAs it studied indicated many could have made improvements in the way they dealt with users or business units that were affected by modernization.  User buy-in often was neglected, which, in turn, had an impact on transition activities.  The Coast Guard's MPT approach ensures user input to the PMO.  MITRE believes that the Coast Guard has made a concerted effort to solicit user involvement in developing Deepwater requirements.

> *Recommendation:*        *Continue to seek end-user input and include major*
>                          *stakeholders in program decision forums.*

## 3.5    Prime Contractor versus Systems Integrator

In some of the programs reviewed, the program offices employed SIs that were separate from the prime contractors, while, in two of the programs reviewed, the government agencies elected to contract with a prime contractor that was also the SI.  In one case the roles and responsibilities of the SI were not clearly defined and the line between inherently governmental functions and prime contractor roles became blurred.  A government program office approach toward using a prime contractor should not rely on limited management and technical resources in the program office.

One comment that came out in the Expert Panel Review suggested hiring an SI on an LOE basis, thus accruing no financial gain to its position as the prime contractor.  The pass-through problem should be dealt with in the basic contract.

Several models can be considered for using a prime contractor and an SI.

- The prime contractor and the SI could be distinct and separate entities.  The SI should be hired on an LOE basis, with some sort of incentive.  The prime contractor should function as a general contractor, and not as the government's "partner."

- The prime contractor also can serve as the SI.  Functions and functional boundaries should be clearly spelled out in the contract.  This approach requires a strong and capable PMO because the check-and-balance system has been removed.

- The prime contractor and the SI can be the same entity.  If the PMO needs additional expertise to manage the contract, it would separately hire a program management contractor for that assistance.

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| ***Recommendation:*** | *The Coast Guard should define clearly in the RFP and the contract the respective roles and responsibilities of the government and the SI.* |

## 3.6    Contract Term

The Expert Panel had divergent views on the best period of performance for the base contract, which the Coast Guard has presently established as five years.  Those with shipbuilding background favored a longer base period; those with more IT-related backgrounds favored a shorter period.  MITRE believes that the Coast Guard's planned term of five years is appropriate. It represents the best compromise between the differing opinions offered by the panel.

However, MITRE also believes that the panel's concern about immediate and more frequent feedback (as opposed to the decision-on-award terms in Year 4) has great validity.  Part of this was related to the panel's lack of exposure to all aspects of the proposed RFP.  Panel members had not seen that the Coast Guard's plans included incentives other than award term.  Yearly award fee reviews or incentives based on performance also should be included in the Coast Guard's plans, as should a schedule of more frequent program reviews, possibly as often as every six months.

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| ***Recommendation:*** | *Use a five-year term for period of performance but provide more frequent feedback on contractor progress to feed award term determinations.  Also, include yearly award fee reviews or incentives based on performance.* |

## 3.7    Option Period Pricing

The Expert Panel recommended against pursuing option year pricing, and MITRE concurs. However, MITRE understands that the Coast Guard still intends to seek such pricing, if for no other reason than to serve as a baseline for discussion of changes in the future.  While MITRE appreciates the Coast Guard's view of the need for this policy, MITRE believes that its potentially detrimental effects should be considered.

First, contractors may balk at providing out-year prices for materials and labor when those prices are so volatile.  Second, the Coast Guard intends to build a partnership in every sense of the word with the selected SI.  Arguments over rates or other pricing items that have changed with the passage of time could have a negative effect on that relationship.  Third, during the out-years, the contractor might be forced to downgrade the quality of the personnel assigned to the Coast Guard effort to remain profitable in the face of drastically higher labor rates than were predicted. Fourth, to provide adequate contractual protection, contractors may have to use extremely high escalation rates, which could result in higher out-year prices.

The Coast Guard has stated that the prices it obtains will serve as the basis for future negotiations.  This should be made very clear to offerors, who should be aware that pricing is important because they will be challenged about changes to it.  However, offerors should also be

made aware of the Coast Guard's continuing flexibility to seek and obtain fair and reasonable, as opposed to lowest, pricing.

> **Recommendation:**    *The Coast Guard should reconsider its option period pricing approach.*

## 3.8    Relations with Oversight Organizations

Another element common among the successful programs was good relations and mutual expectations among oversight organizations[20] to ensure, among other things, continued program funding.  GAO has continued to identify funding as the biggest risk facing the Coast Guard, while the Coast Guard's entire plan is based on Congress allocating the entire $500 million per year to the program.  No contingency planning appears to have been done, and the potential exists for substantial risk that budget fluctuations will occur.

MITRE understands the Coast Guard's reluctance to admit the possibility of any deviations to the proposed budgets.  Congress has stressed the importance of the Deepwater program and, currently, has expressed a desire to fund it.  Therefore, the Coast Guard has taken the position that "all bets are off" if Congress does not fund the program as presently planned.

The Coast Guard needs to consider additional risk planning procedures, and develop plans for scaled back capabilities acquisition because of possible reduced funding levels.  For instance, offerors could be asked to provide alternative plans if alternate levels of funding are provided.  At the least, offerors should be asked to describe their flexibility in adjusting to program changes and they should be graded accordingly.

Due to earlier modernization failures, one of the OGAs is required by Congress to go back to OMB, GAO, and Congress periodically to request release of funding already appropriated for its modernization programs.  The agency must explain its modernization progress, how it has used the previous release of money, and how it plans to use the next funds release.  This short-term planning impedes long-term task orders with the agency's prime contractor. To avoid being placed in such a constricting environment, the Coast Guard should develop an honest, trusting relationship with Congress for the long-term modernization that the Coast Guard is planning.

Maintaining good relations with senior management of DOT is equally important.  The Coast Guard appears to have created good will and garnered support from DOT and outside stakeholders to ensure continued support for the Deepwater Program.

> **Recommendation:**    *The Coast Guard should continue to pursue a proactive relationship with its many oversight organizations.*

## 3.9    Partnering and Relationship Building: Roles and Responsibilities

One of the programs discussed previously in this document was an agency in "partnership" with its prime contractor.  Sometimes the government is reluctant to deal strongly with a contractor because of the "partnership."  Therefore, the term "partnership" needs to be defined clearly by the partners before contract award.  MITRE recommends that the Coast Guard have a team building session soon after contract award (perhaps as part of the kickoff meeting) with the

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[20] The Department of Transportation (DOT), Office of Management and Budget (OMB), GAO, and Congress.

primary government and contractor representatives in attendance to define the partnership and determine how it will operate.

A partnership between a government entity and its system engineering contractor is a unique relationship, and each party must clearly understand the other party's motivation, roles, and responsibilities.  This kind of partnership means that both parties work together toward the same goal, rather than in an adversarial way.  It does not mean that the government relinquishes control or management of the effort, or that the contractor is not responsible to the government, or that the contractor does not have to follow the terms of the contract, including scheduling and technical performance.

Any program or task is more successful when all the parties share a common goal, and each party is dedicated to the success of meeting that goal.  Thus, the contractor and the government can instill camaraderie and team spirit among their personnel, and enhance morale, productivity, and communications.  With a team focused commonly on the success of the project's vision, government program personnel, contractor personnel, and internal and external stakeholders will support the program.  Government and contractor leaders should work toward the shared vision.

The Coast Guard must understand the SI's motivations.  Often companies find their encouragement in quarterly revenues, to the detriment of the long-term outlook.  The better the Coast Guard understands and controls its contractor's motivations, the more the contractor will be willing to work toward the shared vision.

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| ***Recommendation:*** | *The Coast Guard should reinforce the partnership definition, roles, and responsibilities at the kickoff meeting, and should establish a senior management team that meets periodically to address emerging partnership issues.* |

# 4.      Conclusion

Table 2, below, contains a summary of lessons learned that have been drawn from the projects discussed earlier in this document.

**Table 2.  Lessons Learned/Status Evaluation Checklist**

| Lessons Learned | Status of Coast Guard Preparation |
| --- | --- |
| Establish strong senior management support to keep the program moving in the correct direction and control staff rotation. | Establishment of PEO structure, a first for Coast Guard acquisitions, provides a platform for strong support and focus towards achieving overarching program objectives. |
| Foster and nurture an organizational structure focusing on the mission and requiring accountability, coordination, and staff adaptability to build an environment for a healthy esprit de corps. | Key organizational structures, roles and responsibilities are under development and will be captured in the Phase 2 Program Management Plan prior to contract award. |
| Create a governance process prior to prime contract award that defines roles and responsibilities for life cycle management.  Create program management guidelines (processes and procedures). | Roles and responsibilities are being established through the organizational development process (Phase 2 IPT).  Key program management guidelines and procedures are under development and will be captured in the Phase 2 Program Management Plan prior to contract award. |
| Develop an EA that serves as a foundation for systems integration and will be enforced as a modernization framework. | Embedded in the performance based requirements of the RFP. |
| Establish an ELCM as a framework for planning, development, integration, and evaluation. | Keystone to the IDS is "maximize Operational Effectiveness and minimize Total Ownership Cost" which includes the system Life Cycle Cost.  TOC is evaluated during the Phase 2 competition and will be a key measure in granting additional award term and award fee incentives during contract administration after award.  Additional measures will also be incorporated in the Performance Measurement Plan that will support assessment of contractor performance in meeting total system integration responsibilities, system cost/performance analyses, task order readiness review and management, award term evaluations, and award fee or other financial incentives. |
| Create and implement repeatable processes for systems and software acquisition and development | Process embedded in RFP. SI SOW – J7.   In addition to requirements levied on the contractor, the program office has initiated internal SA-CMM learning and application, and received high marks from the GAO for performance in this regard. |

| Lessons Learned | Status of Coast Guard Preparation |
|---|---|
| Include a portfolio management approach to resource allocation decisions that encompass current operations and modernization.  Use an investment decision process that includes top management and major stakeholders (business units). | The system-of-systems nature of the contract, including consideration of legacy assets, to be performed in an IPPD setting drives joint industry & Government consideration of impacts on current operations and modernization. The Resources MPT is presently working to establish business rules for integration and coordination of Deepwater decision processes with the broader USCG resource allocation environment, including the identification of critical management and stakeholder participants. |
| Use business cases to assist top management and oversight authorities to understand project justifications. | Processes and procedures to assist top management and oversight authorities are under development and will be captured in the Phase 2 Program Management Plan prior to contract award. |
| Develop a strategy for what can be accomplished with in-house resources and what should be done with contractor resources.  Seek external help if all the required skills do not exist in-house or are available only on a limited basis. | Phase 2 organizational development includes consideration of intrinsic capabilities and resources, and is integrated with the development of future program support budgets to address the need for contracted resources.  The program has already recognized the need to utilize such resources, and has seamlessly integrated them into the program team. |
| Obtain sufficient external management and technical expertise (systems engineering) to assist with supervision of the prime contractor. | The program has already recognized the need to utilize such resources, and has seamlessly integrated them into the program team in areas including but not limited to systems integration, architecture assessment, design analysis, T&E planning, cost analysis, and technical management. |
| Generate plans to sustain current operations while integrating modernized upgrades.  Integrate current system upgrades with modernization plans. | Key requirement of the RFP.  The contractor's Implementation Plan identifies legacy asset upgrades to maintain OE during IDS build-out. |
| Apply systems engineering to all life cycle activities to assure that products will be coherent, predictable, and manageable, and will deliver business value. | Key requirement of the RFP.  The Systems Integration and Management SOW is a central element of the contract which flows down to all asset task/delivery orders in all life cycle phases to ensure integrated and consistent application of systems engineering and integration processes including schedule planning, EVMS, risk management, quality assurance, data management, environmental management, configuration management, technology refresh, C4ISR architectures, integrated logistics planning, T&E, and performance/cost analysis. |
| Engage actively with oversight organizations to engage them early in the planning process, keep them informed of progress and issues, and generally improve the levels of communication and understanding. | DOT executive level Oversight Council will be established at time of contract award to provide oversight and strategic direction to the IDS Program. |

| Lessons Learned | Status of Coast Guard Preparation |
|---|---|
| Develop realistic schedules of what can be managed effectively.  Plan for the life cycle, not milestone-to-milestone. | Contractor to provide in their competitive proposal.  The schedules will be evaluated as a part of the competitive process and used as during contract administration after award.  Integrated Master Schedule development and management ensure scheduling coordination and consistency, and will allow for activity and resource planning and monitoring across all program areas. |
| Limit the number of tasks that will be conducted concurrently (e.g., simultaneous research, development, and production). | Key requirement of the RFP – task/delivery order development structure is built upon sequential, phased progression from concept and technology development to system development and demonstration, production and deployment, operations and support, and disposal.  Readiness Reviews between these phase progressions demonstrate maturation and support risk reduction. |
| Adopt a release management perspective to identify when interdependent system upgrades are ready to be integrated so that their delivery at a given point in time will produce useable business results. | Satisfaction of Integration Criteria is a key element of Readiness Reviews to be conducted between task/delivery order procurement phases.  Integration criteria focus on system and task dependencies, system-wide TOC and operational effectiveness impact review, and availability of resources to support task progression. |
| Exercise strong program and contract management (i.e., agency oversight of contractor performance).  Carefully consider contracting strategies to ensure that appropriate leverage is available. | Policies and procedures for monitoring contractor performance after award are under development and will be captured in the Phase 2 Program Management Plan.  Additionally, a contractor developed Performance Measurement Plan will be delivered with the RFP and will be approved by the Coast Guard after contract award. |
| Develop a comprehensive system of performance measures and reports to provide feedback on progress, and measure these against approved baselines. | Contractor provided measures and metrics will be evaluated as a part of the competitive process and used as performance baselines during contract administration. |
| Develop and use reliable estimating/accounting procedures to assess contractor costs and schedules and to provide valid information to decision makers for investment tradeoff decisions and budget planning. | Policies and procedures to assess contractor costs and schedules are under development and will be captured in the Phase 2 Program Management Plan prior to contract award. |
| Invest in requirements definition at the beginning of the program.  Ensure that user requirements and expectations are assessed, and that users are kept apprised of schedules and capabilities. | User representation and feedback is provided by active engagement of G-O in all aspects of the program. |
| Develop a systems requirements collection, analysis, and tracking process, and control post-contract award requirements changes. | Requirements management is recognized as one of 10 Key Processes being developed for incorporation into the Phase 2 Program Management Plan. |

## List of Acronyms

| AAS | Advanced Automation System |
|---|---|
| ACE | Automated Commercial Environment |
| ACS | Automated Commercial System |
| ATC | Air Traffic Control |
| ARA | Administrator for Research and Acquisition |
| ATS | Air Traffic Services |
| BSMO | Business System Modernization Office |
| CBA | Cost-Benefit Analysis |
| CBS-ESC | Core Business Systems Executive Steering Committee |
| CIO | Chief Information Officer |
| CMM | Capability Maturity Model |
| CMO | Customs Modernization Office |
| CNA | Center for Naval Analyses |
| COO | Chief Operating Officer |
| CSC | Computer Sciences Corporation |
| Customs | U.S. Customs Service |
| DoD | Department of Defense |
| DOT | Department of Transportation |
| EA | Enterprise Architecture |
| ELCM | Enterprise Life Cycle Methodology |
| FAA | Federal Aviation Administration |
| FFRDC | Federally Funded Research and Development Center |
| GAO | General Accounting Office |
| IC | Intelligence Community |
| iCMM | Integrated Capability Maturity Model |
| IMP | Investment Management Process |
| IPT | Integrated Project Teams |
| IRS | Internal Revenue Service |
| IT | Information Technology |
| LOE | Level of Effort |
| MITRE | The MITRE Corporation |
| MPT | Matrix Project Team |
| NAS | National Airspace System |
| NCAP | National Customs Automation Program |
| NRC | National Research Council |
| OEP | Operational Evolution Plan |
| OGA | Other Government Agency |

| OIT | Office of Information and Technology |
| --- | --- |
| OMB | Office of Management and Budget |
| PMO | Program Management Office |
| POS ONE | Point-of-Sale Retail Sales |
| RRA | Restructuring and Reform Act |
| SA-CMM | Software Acquisition Capability Maturity Model |
| SEI | Software Engineering Institute |
| SI | System Integrator |
| SOW | Statement of Work |
| SW-CMM | Software Capability Maturity Model |
| TSM | Tax System Modernization |
| USPS | U.S. Postal Service |

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